



# FGL Community

## Newsletter

### AUTUMN 2023

**It's that time of the year again when the leaves are red and crunchy, the pumpkins smiling and scary, and the semester new and fresh!**

In this edition of the FGL Community Newsletter (Autumn 2023), you would have a chance to read about the Imoni parties, which a lot of us participate in whether with our FGL friends, our labmates, or our club friends! Our talks of traditions continue with the article on Wafuku, which you have probably seen before but never got the chance to actually learn about. We also prepared an article for you on how to save money while living here in Japan, a must-need for every student! This edition, the Ask Senpai and Research Article were both from FGL seniors that are also FGL Community members, take a look on what they work on and the tips they have for all of us! Lastly, we have an Ask Sensei article on Dr. Eriko Nango, who combines two traditionally very distinct fields: physical chemistry and structural biology! Please do enjoy the rest of the season before the crunchy leaves are covered with white powdery snow.

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In front of Tohoku University's Main Library in Kawauchi Campus



# 4<sup>th</sup>-year Research Article

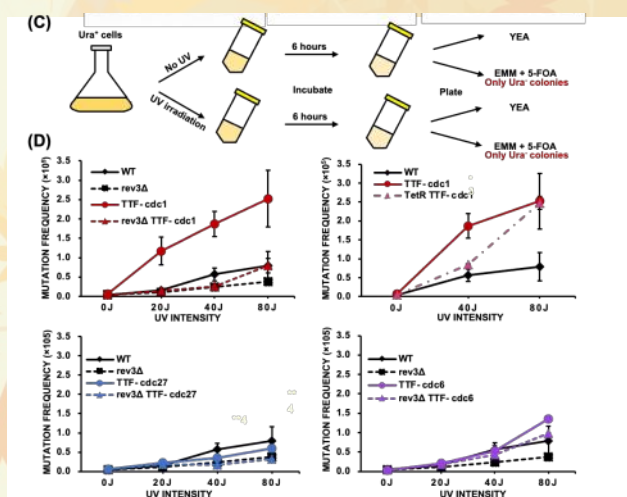
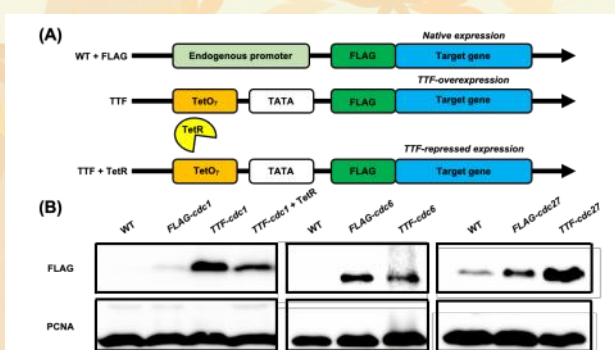
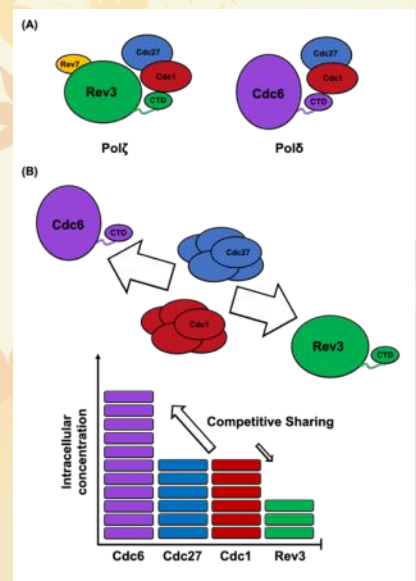
Hi! I'm Ryan, an Indonesian 4th year AMB student and the previous leader of the FGL Community. Unlike the previous 4th year research articles, I would like to share about the research I did that started in my first year. Why? Because of the five research projects I've been involved in during my undergrad, this one turned out to be the most productive, resulting in a paper whose first author is me!



As a background, this research was done when I was working for the Frontier Research Institute for Interdisciplinary Sciences (FRIS), the university's research institute that engages in research from a vast selection of fields, including but not limited to molecular biology, quantum materials, artificial life, and even black holes! I was able to get the position because I independently reached out to a researcher who was in FRIS and, long story short, I was working in the research institute and was leading my own project. This experience ended up becoming the kindling for my research journey throughout my undergrad and has impacted me more than anything else despite having absolutely no correlation to my major and departmental studies.

## Expression Regulation of Shared Subunits Reveals Mutagenic Replication Dynamics of DNA Polymerase $\zeta$ and $\delta$ in Fission Yeast

DNA polymerase  $\zeta$  (Pol $\zeta$ ) is responsible for introducing both spontaneous and damage-induced mutations during replication through error-prone translesion synthesis, causing it to be significant in causing spontaneous cancers. Previously, Pol $\zeta$  has been shown to bind with subunits of the replicative polymerase Pol $\delta$  in ensuring functionality. However, how this interaction regulates the extent of mutagenic DNA synthesis is not known. To elucidate the functional dynamics of Pol $\zeta$  and how it relates to the activity of the main replicative polymerases, we employ a functional mutagenic study using fission yeast as a model. Herein, we show that the ratio of the intracellular abundance between the catalytic subunit of Pol $\delta$  (Cdc6) and the shared subunit (Cdc1 and Cdc27) is crucial in determining the involvement of each polymerase during replication. Upregulation of the shared subunit dramatically increases Pol $\zeta$ -dependent mutations while downregulation decreases them. Downregulation also rescues cellular viability when Pol $\zeta$  is absent. Additionally, structural disruption of the shared subunit's binding site in Pol $\delta$  increases Pol $\zeta$  activity.





# Behind the Paper

Interviewed by Max and Suryo

**What does the beginning of a research project look like? How do you propose something and get it approved?**

One unfortunate thing is that you really must, in some degree, stick to the host lab's resources and expertise. I would say that most, if not all, people before their postdocs probably performed research that got to have something to do with the lab's expertise. However, personally I have always been able to find a way to bridge my true interest and the lab's capabilities, also owing to a tremendously helpful and providing mentor.

So how to do that? Well, in proposing your own research, you really have to know what you want to know. It does not have to be a very specific hypothesis, as in my case, the DNA polymerase zeta complex was very unexplored so it's even hard to predict stuff and come up with a strict hypothesis, but it is clear that the interaction it has with the other polymerases holds some crucial information, so I just focused my research there.

Once you know what you want to know, you can start planning out the experimental design. Of course, creating a scientifically rigorous experimental design needs background knowledge on what methods are typically used and the degree of validity of the methods, not to mention whether such methods can be done in your specific lab. However, do not let this fact deter you as I'm sure that most PIs (Principal investigators) are happy to just discuss with you and let you know of possible experimental designs. In my case, I already had a solid experimental design in my mind (including time and budget constraints for each experiment), causing my proposal to be quickly accepted and it allowed me to immediately start experiments.

**How did you come to choose this topic to research? Did you get the idea yourself?**

I have always been interested in cancer research. Interestingly, I have absolutely no personal experience with cancer—I have never seen a cancer patient with my own eyes. My fascination with cancer comes because cancer itself is an interesting intellectual challenge for me, i.e., it's very hard to cure and I want to try my hand at it. So, after getting accepted at the position, I browsed through the lab's current and previous projects to see if there is anything that relates to cancer. I ended up finding the DNA polymerase zeta topic which, after reading through review papers on it, I found out has an interesting yet unexplored relation to oncogenesis. Because I like my approach to be specific and detailed (so-called 'reverse genetics'), I then browsed the known complexes that it forms and finished choosing my target genes for my experiments.



**If it was your idea, would you say it came naturally to you, or did you have to find inspiration for the topic?**

Of course, for the topic in broad, like I said, I have to somewhat align to the host lab's capabilities, so in a way my inspiration comes from the lab's previous project. However, after finding that out and aligning it with my true interest, how I choose my targets and how I construct the experimental design came naturally. But personally, I don't think that whether a research topic comes naturally or not necessarily plays a role in how hard you'd work for the research. Some people may find the ideas that come naturally as a product of their own curiosity, resulting in them striving harder to prove it. On the other hand, some people may get so inspired, maybe from other researchers, that they end up getting so involved in the topic that it starts to feel like their own original one. But one thing's for sure, you will definitely regret it if you perform research on a topic that you genuinely have no interest in.

**I think a fair share of our readers are high school students planning to enter Tohoku University. Can you tell us a bit about what your personal experience is with doing research in Tohoku University?**

Although I have faced a good number of barriers when trying to get research experience, I would say that things are definitely getting better and I have personally proved that, yes, there is a plethora of research opportunities here if you are willing to actively look for them. Like I mentioned, I personally have been involved in five different projects that each dealt in very different fields of biology and on very different scales. As an undergraduate, experiences like that are extremely rare and beneficial and I have never regretted my choice to participate in them (and I hope that they can give me a strong edge in graduate school applications, wish me luck!).

Once I got in an actual position, I would say that the research environment is generally good, especially because all of the supervisors I have worked with are truly amazing researchers themselves and really good mentors. In research institutes, I would say that the environment is very much like a group work, where everyone treats each other as equals and expects each other to work towards the same goal. On the other hand, in the faculties and graduate schools, the environment is more education-focused, where professors and senior students would pay more attention to assist the junior members and help them get a strong grip on what the lab does and how the lab works. Again, I don't think that one is better than the other, both still resulted in a healthy research environment. Not only the actual research, I like that they have a seminar system here that seems to extend to every lab which allows you to not only be more familiar with what your peers do, but also helps you to expand your knowledge passively.





# Imoni parties

By Sumaya and Dylan

How do you know winter is around the corner in Tohoku, Japan, without telling? Exactly, you guessed it right! It is when you gather by a riverside with an outstanding Autumn view to cook a traditional dish called Imoni. Imoni is a type of nabe (hotpot) meal containing meat and taro soup, and is usually eaten as part of a tradition in the Tohoku area in the autumn. It is believed to originate in the mid 1600s when a boat filled with cargo reached the Nakayama-machi Nagasaki area and they had to wait for the consignee to show up. In the meantime, they would party by the riverside around a pot cooking taro (from the surrounding village) and cod (from their boat) to pass the time.

Imoni has various ingredients in modern times which vary depending on the prefectures. However, multiple key ingredients are almost always present in Imoni: taro root (里芋), thinly sliced meat (beef or pork), konnyaku, as well as soy sauce. Additional ingredients could also include Chinese cabbage (hakusai), burdock root, daikon, carrot, mirin, and many more.

Yamagata prefecture is heaven for holding an imoni party because of its sacred Mt. Gassan and ski slopes of Zao Onsen. Every September, a festival is held where a six-meter cauldron full of Imoni, enough to serve 30,000 guests, is placed. They even have their own excavators to help mix the stew and the whole cooking process takes around 4 hours!



Image source = [https://www.tohokukanko.jp/en/attractions/detail\\_10064.html](https://www.tohokukanko.jp/en/attractions/detail_10064.html)

In other prefectures in the Tohoku area, people celebrate Imoni parties by cooking them outdoors, usually by preparing a fire near a river. Many of the Tohoku University labs also celebrate the imoni party with all of its members in the autumn season. This celebration is not just about the delicious food but also an excuse to bring people together amidst their busy lives in autumn, and also to welcome the season itself. The convenience stores around the rivers are brimming with imoni ingredients around this time of the year and that's when you know you gotta party soon.



# ASK SENSEI

Professor Eriko Nango

Interviewed by Aroob and Jojo



*The interview transcript between Professor Eriko Nango and our interviewers*

**To start off the interview, could you tell us a bit about yourself?**

I was born and lived in Sendai until I was 2 years old, and then spent my childhood in Akita and Chiba. I proceeded to the Department of Chemistry, Tokyo Institute of Technology, and continued on to the graduate school of the same institute. My favorite pastime is playing the piano. I wanted to be a pianist when I was a child.

**What first inspired or pushed you to study structural biology?**

The laboratory that I belonged to in the institute was focusing on “natural product chemistry,” which is different from structural biology. My research target was the enzyme involved in biosynthesis of antibiotics. I synthesized substrate analogues and analyzed its enzymatic reaction with the substrate analogues by NMR and MS spectrometers. I became interested in the three-dimensional structure of the enzyme, and began studying protein X-ray crystallography at a collaborator’s laboratory in 2000. Although I became an assistant professor in the natural product chemistry laboratory, I wanted to engage in development research on protein X-ray crystallography. Therefore, I resigned from the assistant professor position and moved to SPring-8 in 2010, changing my research field to structural biology.

**Could you tell us a little bit about your work on the use of quantum beams to record protein conformational changes and chemical reactions?**

In 2013, I started to work on the development of protein X-ray crystallography at SACLA, which was established next to SPring-8, providing a new type of light called X-ray free electron lasers (XFEL). XFEL allows us to observe protein structures before the onset of radiation damage and to capture changes during reactions with a high temporal resolution of several tens of femtoseconds at the atomic level. However, we need to perform the measurement in a different way from conventional X-ray crystallography due to the nature of XFEL. We challenged time-resolved experiments to visualize movements in proteins while developing devices for the measurements. In 2016, we successfully captured conformational changes of the protein bacteriorhodopsin, a light-driven proton pump during proton transfer after light illumination using our developed devices as a three-dimensional movie. Bacteriorhodopsin is a membrane protein with seven helices, and its proton transport mechanism has been of interest for a long time. Although many photo-intermediates have been determined by conventional X-ray crystallography, the debate for the mechanism was not concluded. We elucidated how the protein transports protons in one direction without back-flow from the obtained XFEL data.



**How has your research and professional journey been for you so far? Has there been any significant failures or successes that you could share with us?**

I became an assistant professor which is a permanent job after completing the doctoral program, but I resigned from this position to become a postdoctoral researcher which was a contract worker in order to change a research field from natural product chemistry to structural biology. I also wanted to balance my life and work by changing my position at that time. In Japan, such a decision would have resulted in almost giving up on a future career as a researcher. I did not think that I could become a principal investigator to lead my own laboratory. However, surprisingly, this decision led me to begin the new research using XFEL, yielding many successful results in protein dynamics studies. The research fields that I previously studied contributed greatly to protein structure analysis using XFEL. What seems to be a failure may never be a failure. I believe it is necessary to work on things in the long term.

**If you could turn back the time, do you think you would do anything differently in your career?**

To be honest, I do not want to go back in time because I had a tough time when I was young. If time could be turned back, I would take the same path. Basically, I have no regrets about my career to date and am proud to have continued my research while raising two children.

**What about your plans for the future? In what direction would you like your research to go in the next five years?**

Visualizing structural changes in a protein is not so trivial because it requires protein molecules in a crystal to react simultaneously. In the first time-resolved experiment, a light sensitive protein was used. However, such proteins account for less than 1% of all proteins. Most proteins bind to small-molecular compounds and initiate reactions. Therefore, I will continue to develop devices for the measurements using XFEL so that such movements can be observed. In addition, I would like to extend the technology to rational protein design based on the obtained dynamic structures.

**Lastly, do you have anything to say to the students who may be interested in structural biology?**

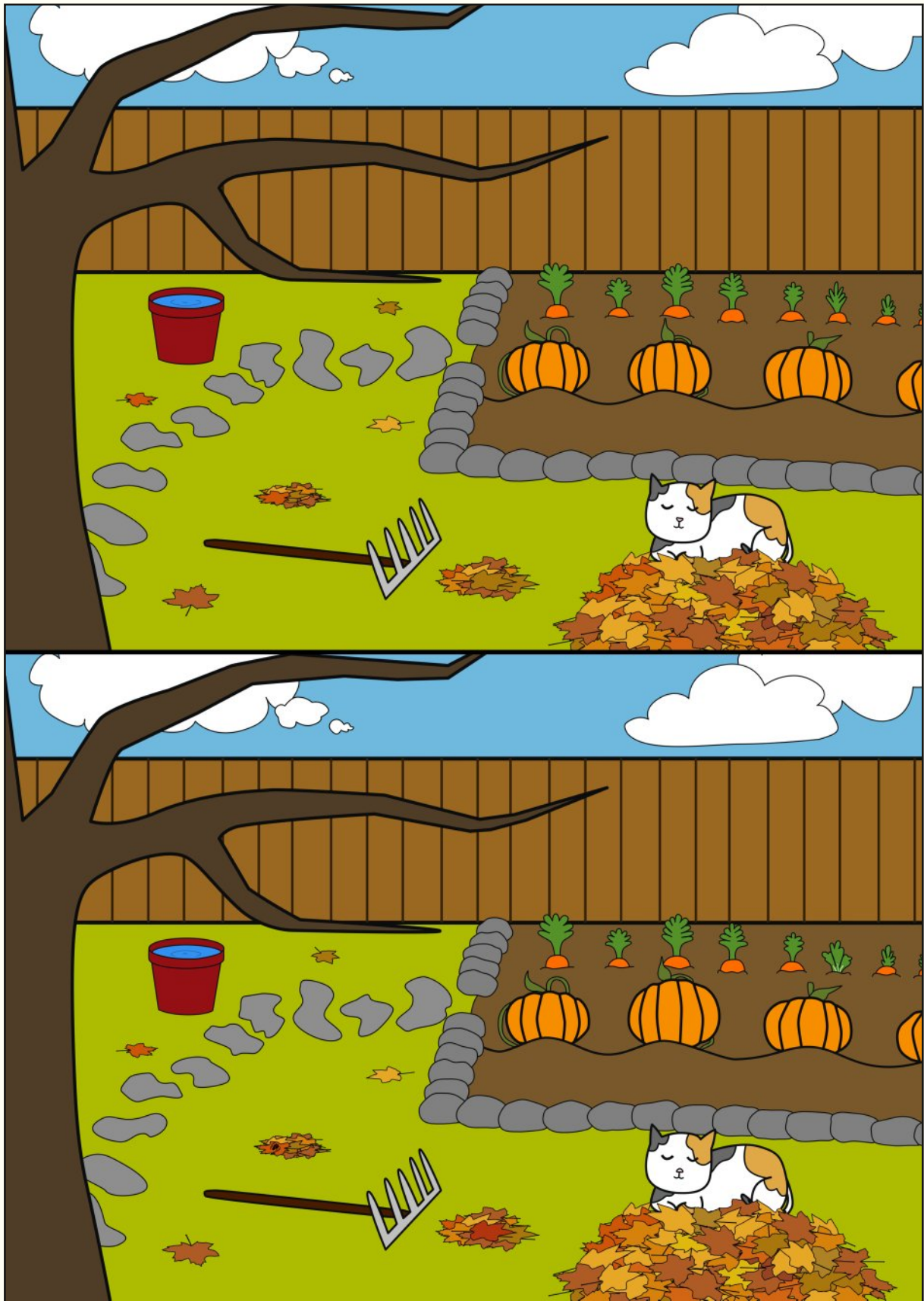
As the saying goes, "seeing is believing". In structural biology, we observe an object and understand it deeply. So far, powerful methods including X-ray crystallography and cryo-electron microscopy have been developed to elucidate a target protein. In the future, it is expected that we will not only analyze proteins but also design a new protein and explore research using these proteins. If you are interested in structural biology, please feel free to visit my laboratory!





# Find the Difference!

Find the 10 differences between the two images below!



Art by Steven

Go to the final page for the answer!



# Practical Ways to Save Money in Japan

Written by Kamila

The breeze of autumn is coming and so is the new batch of FGL students. Despite having a sky-rocketing excitement of starting school, whether they like it or not, one of the most challenging things for newcomers starts to show up: adapting to the new environment, new life, and undeniable financial reality - the living cost difference.

It's indeed true that the living cost in Japan could be significantly more expensive compared to other countries. This could be a shock to some people, in which their dreams and plans to go on trips throughout Japan can be shattered. Here, we are going to discuss a few possible ways to save money throughout the school year and make it still possible to afford a holiday trip.

## Transportation

Depending on which mode of transportation you're choosing, the transportation costs could vary. For instance, the cost of subway tickets varies between 210 to 250 yen depending on the distance between stations. Frequent commuting between adjacent stations, like from Aobayama to Kawauchi, can add up quickly. Other options, such as taxis, can be even more expensive.

Fortunately, there are some ways to prevent the rise of the transportation cost. The Sendai transportation bureau offers a city bus and subway free pass for students, allowing them to use these services throughout Sendai. Picture this: suppose that you do round-trip travels 5 days a week for 1 month (4 weeks), and the cost of each trip is 210 yen. Based on this calculation, your total expenditure would be around 8,400 yen. However, by opting for a subway pass, depending on which lines you're choosing, you can spend as little as 6,990 yen for either the Namboku Line or Tozai Line, or 8,390 yen for both.

Furthermore, if you're using the buses instead, the cost of the city bus pass will be 5,970 yen per month. You can get further information regarding this on the following website: Sendai City Transportation Bureau Gakuto Sendai City bus/subway free pass ([www-kotsu-city-sendai-jp.translate.goog](http://www-kotsu-city-sendai-jp.translate.goog))

Some students also prefer to use bicycles, which can be a cost-effective option in the long run and could also reach the places that can't be reached easily by subway or buses alone. As a reference, one of the most famous bicycle stores is Hayasaka Cycle where the bike could typically cost around 10,000 yen or above for non-electric bikes and around 100,000 yen or above for electric-assisted bicycles. You can also consider purchasing a second-hand bike from stores like Hard-Off or online platforms such as Mercari for a more budget-friendly option.



## Budgeting and Planning

To effectively save money while studying in Japan, it's crucial to create a well-structured budget for both your income and expenses. One way to do it is to use an app to help you track your spending and split your money into smaller amounts. Start by making an outline of how you want to spend your money and why. For instance, you can allocate 50% to food and 20% to savings. Subsequently, you can start picturing your financial goals - how you want to spend the money you have saved so far. This way, you can easily track your spending and work towards exciting goals, like a trip to Hokkaido or buying that electric guitar you've always wanted. Although there are many budget planning apps available in AppStore and Google Play Store, you can simply use tools like Microsoft Excel or the Notes app on your mobile device. Additionally, some individuals prefer to allocate their money for different purposes into separate accounts or even different wallets.

## Cooking

After living in Japan for a while, you might start to notice that your food expenses might be pretty expensive. Preparing your meals is a practical way to press down your spending. There are many sources of cooking materials on the internet if you just started learning how to cook for the first time. Furthermore, by cooking your own meals, you gain a clearer estimation of how much you'll actually spend in a week whenever you go out shopping.

Talking about shopping, if you go to the grocery store at night, there might be some ingredients that are sold at a relatively cheaper price as indicated by a yellow sticker on top of the packaging. This is a smart strategy to trim your grocery bill.

On the other hand, there are of course some downsides to cooking your own food. As a student, your main responsibility is to study, do homework, and do other things. Although cooking your own food might be cheaper to some extent, it could be time-consuming since not only do you have to prepare the ingredients and cook them, but you also have to think about the menus you'll be cooking. For that purpose, to simplify your food planning process, you can also surf the internet to find some recipe ideas or even ask ChatGPT to prepare a one-week meal plan.





# ASK SENPAI

Tonklar Khaimuk (TK), 4th year IMAC-U student

Interviewed by Avin



**Can you please introduce yourself and tell us a bit about your academic journey in engineering? What inspired you to pursue this field of study?**

My name is Tonklar Khaimuk, you can call me TK. I am a 4th year student of the IMAC-U program. My journey in engineering is quite wild, to be honest. It started as an interest in robotics from high-school, and then in university, I started to pursue the material side while also self-learning the software-engineering side. I want to pursue what I am interested in: engineering as a whole. I am the kind of person who is always having fun while using logic and creativity to solve real world problems. I explore multiple fields and kinds of engineering to be able to fulfill my goal.

**In your fourth year of engineering, can you share some details about your current research or projects you're involved in? What motivated you to delve into this particular area of engineering or research?**

I am now involved in a project about contacts involving graphene with a metal electrode. By observing the properties of the contact, especially its electrical properties, it can be made into a new mechanism of creating an electron pathway for solar cells with very high efficiency. Graphene has very unique properties which allows electrons to travel through it at very fast speeds with ease of manipulation. I think this research area has a very good perspective for the future, especially in terms of solar energy. Moreover, most of the mechanisms and properties are still unknown, which makes it look fun and interesting.

**As a student in Japan, what do you find most fascinating about the country and its culture? Are there any cultural experiences that have left a strong impression on you?**

I think Japan is a very easy place to live with safety. The traffic system along with the town management impress me so much. From a cultural point of view, I think that temple architecture and construction are related, and they inspire me. I love going to Japanese temples, and I love how they are always surrounded by a very beautiful nature. While I haven't had one single cultural experience that left an indelible mark, I eagerly look forward to exploring more temples, especially in Nara and Kyoto!



**Juggling the demands of engineering studies and research can be challenging. How do you maintain a healthy work-life balance? What hobbies or interests do you have that provide a break from your academic and research commitments?**

Firstly, I will try to adjust my schedule so that I will also have time for my hobby and to be able to rest enough. However, it's very hard to find this balance in practice, since things can get a bit chaotic when you do not know what will happen tomorrow. When that happens, I experiment with different schedules for about a week or two to find the most comfortable balance both physically and mentally. For example, I may shuffle things around a bit so that I can get better at coping with more various situations, and from that I will be able to maintain the balance in a very chaotic real-world situation. Another point is that I will also keep in mind the importance of free-time to let me have the time to process things. I think these two methods combine to be a good approach to maintain time balance. I have always had an interest in chess, PC games, and music. These help me to relax, have fun and to reduce stress from academics.

**What advice would you give to junior students who are aspiring to follow a similar path in engineering and research?**

I think the best advice I could give is that you need to always have fun with what you do. The fun in solving things or the fun in curiosity will drive you forward in any thing you do, even for research or other things in life. Yes, in a real situation, you will not be able to be happy or have fun all the time, but I think if you always keep this in mind it will always bring you back to the right track ;).

**Is there anything else you'd like to share with our readers, perhaps a memorable experience or an important life lesson you've learned during your time at Tohoku University**

I usually don't say this because I hate telling other people what to do, but one important point I realized from stressing too much over learning back then is that it feels like your teenager life is ruined because you didn't remember anything other than the time you've spent studying. University life should be about more than just academics. It is also about making memories and cherishing them. It is true that you need to concentrate on your learning, but I request everyone to go out sometimes. You will learn something that sometimes you won't expect. You might end up doing some extra-curricular things and talking with different people. Lastly, don't forget the people who are beside you in the darkest time, and be grateful for what life presents you with.





# Story about Wafuku: Japanese traditional style clothing

Article and Illustration by Mimie (Chanisa P.)

What are the things that come to your mind when you think of 'Japan'? It may be the beautiful scenery, delicious food, or great anime, and for some, it might be the image of people in beautiful traditional clothes that pops into our mind. You might have heard about the Kimono, the most well-known Japanese clothing. Actually, other than the various kinds of Japanese clothing that can be worn on many different occasions and seasons, there are more accessories and interesting items to learn about too! In this topic, I will mention some of the main Japanese clothings, accessories, their usage, and maybe some more interesting facts too!

## I - Clothes

### Kimono (着物)

Kimono is probably one of the most well-known Japanese clothes. 'Kimono' actually means 'things to wear', so it is a very broad term to describe the traditional costume. There are various styles and types of Kimono, almost all of the clothes mentioned below are a part of kimono too.



### Yukata (浴衣)



Some people may confuse yukata with traditional kimono, because both are very often seen on movies or anime. Its name means 'bathing cloth'. It is one of the informal kimonos with less complex styles originally used for bathing cloth, now it is worn widely in the summertime, especially in the summer festival and firework watching.

### Hakama (袴)

Hakama is the long, pleated trouser that was worn by samurai and those of higher class in the past. Nowadays it is mainly used in many ceremonies and martial arts, or by shinto priests and monks.



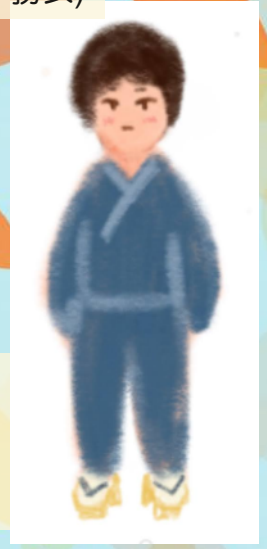


### Fundoshi (褌)



Fundoshi is a type of men's undergarment worn in many occasions, mainly at '夏祭り' or summer festivals performance.

### Samue (作務衣)



Samue is the loose and more casual outfit mostly made from blue cotton and originally worn by monks. Now, it is worn as a regular indoor outfit.

## II - Shoes

### Geta (下駄)

Geta is the wooden sandal for everyday life, some had the '歯' or teeth under that lift the shoes up for walking on the rain or snow.



### Okobo (おこぼ)



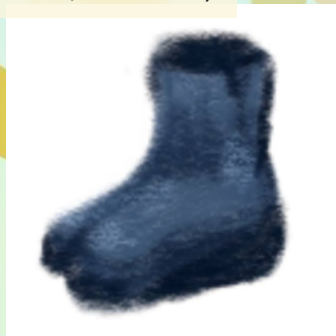
Okobo is the strappy platform shoes that is mostly worn by 'Maiko', as its color represents the class of Maiko.

### Tabi (足袋)

Tabi is the pair of socks that divides the big toe apart from others, now still wearable as the regular socks.



### Jika-Tabi (地下足袋)



Rubber shoes with toe - divided platform that was inspired from the Tabi sock. Originally created for workers in the early 20th century.



### III - Accessories

#### Kanzashi (簪)

Hair ornaments with wide variations from simple to very elaborate made from precious materials like gold or tortoiseshell.



#### Kinchaku (巾着)

Cloth bag with drawstrings for carrying personal effects. Mainly seen nowadays with kimono.



#### Sensu (扇子)

A folding fan originally used by the people of the imperial court, now used in traditional performances such as Kabuki and Noh.



#### Wagasa (和傘)

Traditional handmade umbrellas made from oiled washi paper and bamboo frame, some with a delicate pattern or color. It is quite durable against water, but still needs special care for longevity.





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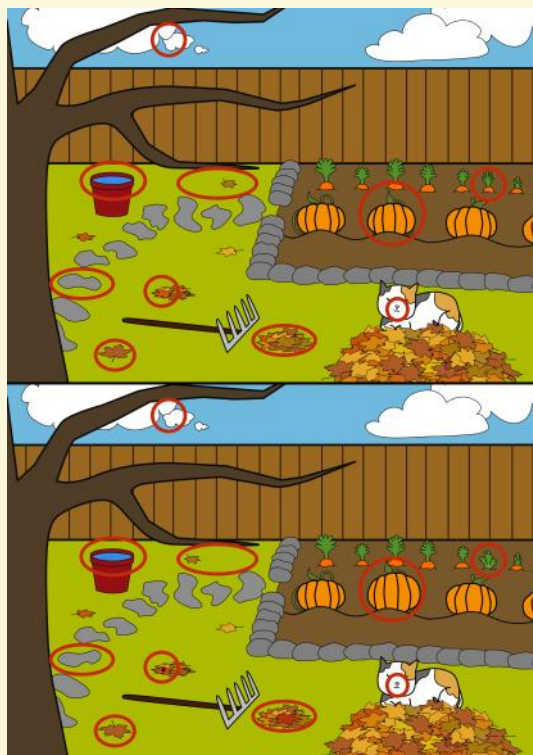
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